

August 2, 2006

Mary L. Cottrell, Secretary
Department of Telecommunications and Energy
One South Station
Boston, MA 02110

Re: D.T.E. 06-5

Dear Secretary Cottrell:

Yesterday, on behalf of Massachusetts Electric Company and Nantucket Electric Company d/b/a National Grid, I filed the supplemental testimony of Theresa M. Burns and Susan L. Hodgson. By that filing, National Grid respectfully requested approval to implement an increase in its base transmission service rates on September 1, 2006. The reasons for the request are (1) increased Reliability Must Run ("RMR") costs billed to National Grid since it first presented its 2006 forecast in its January 27, 2006 filing ("January 2006 Filing") in this docket and (2) the elimination of a one-time credit that New England Power Company provided in 2005, but was reflected in the test year used to develop the Company's original forecast contained in the January 2006 Filing. By this letter, I am providing the testimony by Philip J. Tatro, Consulting Engineer for National Grid, who provides background on the RMR contracts and the transmission improvements that are underway to mitigate RMR costs in Massachusetts.

Thank you very much for your time and attention to this matter.

Very truly yours,


Amy G. Rabinowitz

cc: Service List

MASSACHUSETTS ELECTRIC COMPANY
NANTUCKET ELECTRIC COMPANY
d/b/a NATIONAL GRID
Docket No. D.T.E. 06-5
Witness: Philip J. Tatro

DIRECT TESTIMONY
OF
PHILIP J. TATRO

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I. Introduction and Qualifications

Q. Please state your full name and business address.

A. My name is Philip J. Tatro and my business address is 25 Research Drive, Westborough, Massachusetts 01581.

Q. By whom are you employed and in what capacity?

A. I am employed by National Grid USA Service Company, Inc. as a Consulting Engineer in the Transmission Network Planning & Development department. My responsibilities include performing transmission planning related services for companies of National Grid USA ("National Grid"), including Massachusetts Electric Company ("Mass. Electric") and Nantucket Electric Company ("Nantucket"), together d/b/a National Grid (together "Company").

Q. Please describe your educational background and training.

A. I graduated Magna Cum Laude from Rensselaer Polytechnic Institute in Troy, New York with a Bachelor of Science degree in Electric Power Engineering in 1985. I also received a Master of Engineering degree in Electric Power Engineering from Rensselaer Polytechnic Institute in 1986. I am a registered Professional Engineer in the Commonwealth of Massachusetts.

Q. Please describe your professional experience.

A. I joined New England Power Service Company ("NEPSCO") in 1986. I have had

1 assignments in the Relay and Control Engineering Group, the Hydro-Québec/New
2 England Phase II High Voltage direct current (“HVdc”) Project, the Special Projects
3 Group of New England Electric Resources, Inc., and Transmission Planning. I have been
4 in my present assignment in Transmission Planning since 1996. I am responsible for
5 bulk ac transmission planning studies relating to transmission expansion, interconnection
6 of generation, and long-range operational planning. I represent National Grid on several
7 committees, task forces, and working groups of the North American Electric Reliability
8 Council (“NERC”), the Northeast Power Coordinating Council (“NPCC”), and the New
9 England Power Pool (“NEPOOL”). I recently chaired the NERC Major System
10 Disturbance Task Force responsible for dynamic simulation of the August 14, 2003
11 Northeast Blackout. I am a member of the NEPOOL Reliability Committee (“Reliability
12 Committee”). This committee is responsible for reviewing reliability related matters and
13 providing recommendations to Independent System Operator of New England (“ISO-
14 NE”) on matters such as Reliability Must Run (“RMR”) determinations for generating
15 units and the transmission system upgrades that would be required in lieu of RMR
16 agreements.

17
18 **II. Purpose of Testimony**

19 **Q.** What is the purpose of your testimony?

20 **A.** The purpose of my testimony is to identify the RMR contracts that are affecting charges
21 to the Company from ISO-NE, explain why ISO-NE believes that the RMR contracts are
22 necessary, identify the transmission improvements that are necessary to mitigate or

1 eliminate the need for the RMR contracts, and address the status of transmission
2 improvements by the transmission owner on whose system the transmission improvement
3 is being made. My testimony serves to supplement that provided by Susan L. Hodgson in
4 the Company's August 1, 2006 request for an increase in its transmission rates to become
5 effective September 1, 2006.
6

7 **III. ISO-NE Determinations of Need for RMR Contracts**

8 Q. What is the process utilized by ISO-NE to determine whether a generating unit qualifies
9 for an RMR contract?

10 A. Any generating unit owner may request that ISO-NE perform an RMR assessment to
11 determine whether a generating unit is required for reliable operation of the power
12 system. ISO-NE staff performs an analysis of the need for the unit based on the criteria
13 provided in the ISO-NE Planning Procedures and Operating Procedures. Analysis is
14 based on the requirements identified in ISO-NE Planning Procedure No. 3, *Reliability*
15 *Standards for the New England Area Bulk Power Supply System* (PP-3). The power
16 system response is evaluated for a list of contingency conditions as specified in Section
17 3, "Area Transmission Requirements." The assessment is performed based on
18 unavailability of the unit requesting the RMR determination and a forced outage of the
19 most critical unit remaining in the local area. A generating unit is identified as required
20 to maintain system reliability if the system performance results in a violation of the
21 *Reliability Standards* following any of the defined contingencies for which ISO-NE
22 would dispatch the generating unit in real-time operations. Pursuant to ISO-NE

1 Operating Procedure No. 19, *Transmission Operations* (OP-19), ISO-NE will not
2 dispatch a generating unit to protect against certain contingencies unless the resulting
3 power system performance would result in a significant adverse impact outside of New
4 England. Specifically, this applies to contingencies “b” and “c” in Section 3.1 of PP-3,
5 relating to breaker failure and double circuit tower contingencies. A breaker failure
6 contingency involves a fault on a transmission line or transformer and failure of a circuit
7 breaker to interrupt the fault current, requiring additional circuit breakers to open to clear
8 the fault and typically isolating a second line or transformer. A double circuit tower
9 contingency results in tripping of two transmission lines that share a common structure.
10 Because of their relatively lower probability of occurrence, ISO-NE Operating
11 Procedures do not protect against these kinds of contingencies unless the contingency
12 would jeopardize the reliability of areas outside of New England.

13
14 The ISO-NE assessment considers resource adequacy and transmission adequacy.
15 Resource adequacy is evaluated with a probabilistic assessment of whether there will be
16 adequate generating resources available to supply the load demand for a large number of
17 scenarios of scheduled and forced generation outages. Transmission adequacy is
18 evaluated with a deterministic assessment of whether the transmission system can
19 withstand the above referenced design contingencies without violating the *Reliability*
20 *Standards* with regard to maintaining facility loading and bus voltages within defined
21 operating limits.
22

1 Results of these analyses are presented at a meeting of the Reliability Committee.
2 Members of the committee may provide input to ISO-NE regarding the analyses,
3 although the Reliability Committee does not formally vote on a recommendation to ISO-
4 NE.

5
6 **IV. Potential Reliability Issues**

7 Q. What generating units in Massachusetts have been identified by ISO-NE as being
8 required to maintain reliability of the bulk power supply system?

9 A. In the Northeast Massachusetts/Boston zone, New Boston unit 1, Mystic units 7, 8 and 9,
10 Salem Harbor units 1, 2, 3, and 4, and Kendall units 1, 2, 3, and Jet 1 have been
11 identified. In the Western and Central Massachusetts zone, W. Springfield units 3, 10,
12 GT1 and GT2, Berkshire Power, Pittsfield Generating, and Woodland Road have been
13 identified. In the Southeast Massachusetts zone, the Potter and Fore River plants were
14 identified, although subsequent analyses have indicated that RMR contracts are not
15 required for these two plants.

16
17 Q. Please describe the reliability standard violations that could occur if these units were not
18 granted RMR contracts.

19 A. New Boston unit 1 is required for resource adequacy within the Boston Import interface
20 and for transmission adequacy to prevent overloads of transmission facilities in
21 downtown Boston. It has an annualized fixed revenue requirement of \$30 million.

1 Mystic units 7, 8, and 9 are required to meet resource adequacy requirements within the
2 Boston Import interface and for transmission adequacy to prevent overloads of facilities
3 and voltage violations within the Boston Import area. ISO-NE Operations also has
4 identified that the Mystic units are required for controlling high voltage and regulating
5 voltage in downtown Boston. The annual revenue requirement for units 8 and 9 is \$238
6 million. An RMR contract for Mystic 7 was filed at FERC, but was rejected without
7 prejudice.

8
9 Salem Harbor unit 1, 2, 3, and 4 are required for resource adequacy within the Boston
10 Import interface and for transmission adequacy to prevent overloads and voltage
11 violations in the North Shore area within the Boston Import interface. The Salem Harbor
12 units have an annual fixed revenue requirement of \$3.4 million.

13
14 Kendall units 1, 2, and 3 are needed for transmission adequacy for local support of load
15 in the Cambridge area. The annual fixed revenue requirement for these units is \$7.9
16 million.

17
18 West Springfield units 3, 10, GT1, and GT2, and Berkshire Power are needed for
19 transmission adequacy to prevent the overloading of the East Springfield – Breckwood
20 (1322 circuit) 115 kV underground cable, which serves the Springfield area load. This
21 cable is also essential to support the current level of import capability into Connecticut
22 from western Massachusetts that is necessary to meet reliability criteria. West

1 Springfield unit 3 and Berkshire Power have annual revenue requirements of \$8.3 million
2 and \$30.2 million, respectively. The West Springfield units GT1 and GT2 have an
3 annual revenue requirement of \$12 million, but FERC has not yet approved this RMR
4 contract for billing at this time. Its requested date is March 31, 2006. An RMR contract
5 has not been filed for West Springfield unit 10 at this time.

6
7 Pittsfield Generating is needed for transmission adequacy to prevent low voltages in the
8 area with the Berkshire 345-115 kV transformer out of service. There are limited
9 transmission and generation resources that make up the primary supply for the Pittsfield
10 area, without which the area relies on a 115 kV transmission system that cannot
11 adequately provide voltage support in the area under certain contingency conditions. The
12 annual revenue requirement for Pittsfield Generating is \$36.5 million.

13
14 Woodland Road is needed for transmission adequacy to prevent low voltages in the area
15 following a contingency loss of the Doreen – Oswald – Woodland (1161 circuit) 115 kV
16 line. This contingency isolates the local load from the relatively strong 345 kV source at
17 Berkshire, leaving the load supplied radially from the relatively weak 115 kV system in
18 the Springfield area. An RMR contract has not been filed for Woodland Road at this
19 time.

20
21 The Potter and Fore River plants were identified as needed for transmission adequacy to
22 prevent overloads and voltage violations for an outage of the Holbrook – Auburn (335

1 circuit) 345 kV line and for a number of breaker failure and double circuit tower
2 contingencies in the Auburn Street area.
3

4 **IV. Transmission System Upgrades Required to Eliminate RMR Contracts**

5 Q. What transmission system upgrades would eliminate the need for RMR contracts with
6 these plants?

7 A. The RMR need for New Boston 1 will be addressed by stage 1 of the NStar 345 kV
8 upgrades between Stoughton and Hyde Park and between Stoughton and K-Street. The
9 345 kV cables are expected to be placed in service within the next month. ISO-NE has
10 approved a Proposed Plan Application to place the unit in deactivated reserve effective
11 January 1, 2007.
12

13 The RMR need for Mystic units 7, 8, and 9 will be mitigated by stage 1 of the NStar 345
14 kV upgrades. These upgrades are expected to eliminate the requirements to operate the
15 Mystic units to prevent overloads and for voltage control in the downtown Boston area.
16 By increasing the Boston Import interface capability the upgrades mitigate the need for
17 these units for resource adequacy within the Boston Import interface. The original ISO-
18 NE determination of need for these units indicated that these units would be required to
19 maintain reliability at least until the planned Boston Import upgrades are placed in
20 service. ISO-NE is presently evaluating the continued need for an RMR contract for
21 these units with the NStar upgrades in service.
22

1 The RMR need for the Salem Harbor units will be addressed by the National Grid North
2 Shore substation upgrades at Ward Hill and Salem Harbor and reconductoring of three
3 115 kV lines in the Ward Hill area. These upgrades eliminate the need to operate the
4 Salem Harbor units to prevent overloads and voltage violations in the North Shore area.

5 The NStar 345 kV upgrades address the need for these units for resource adequacy within
6 the Boston Import area. However, the future need for these generating units for resource
7 adequacy is dependent on load growth and availability of generation within the Boston
8 Import area. Retirement of generation within this area could create an RMR need for
9 remaining generation.

10
11 The RMR need for the Kendall units will be addressed by an NStar project to construct a
12 new East Cambridge 115-13.8 kV substation and a new 115 kV supply cable from
13 Putnam to Kendall. The project received approval from ISO-NE in June 2004 with an
14 expected in service date of September 2005. Delays associated with completion of the
15 115 kV supply cable have extended the need for the Kendall units.

16
17 The RMR need for the West Springfield units and the Berkshire Power units will be
18 addressed by transmission upgrades in the Springfield, Massachusetts area. Northeast
19 Utilities is presently developing alternatives to address overloads and voltage violations
20 in the Springfield area to address load growth in Western Massachusetts and the transfer
21 of power into Connecticut from western Massachusetts. The alternatives under
22 consideration also have been evaluated as part of the joint ISO-NE, Northeast Utilities,

1 and National Grid Southern New England Transmission Reliability study. This joint
2 study will provide a coordinated plan to address transmission reliability issues in
3 Massachusetts, Rhode Island, and Connecticut.
4

5 The RMR need for the Pittsfield Generating plant could be addressed by additional shunt
6 reactive compensation, additional generation, or additional 345-115 kV transformation in
7 the area. Northeast Utilities has installed 115 kV capacitor banks in the area at Pleasant
8 Street and Woodland Road which mitigate the need to operate these units to prevent
9 voltage violations; however the capacitor banks are not sufficient to remove the RMR
10 need. Additional proposed upgrades will be identified in the 2006 Regional System Plan
11 (“RSP06”).
12

13 The RMR need for Woodland Road has been addressed by the capacitor bank additions
14 at Pleasant Street and Woodland Road. The ISO-NE Evaluation of Need for Woodland
15 Road issued in January 2006 indicated that once these capacitors are in-service
16 Woodland Road will no longer be needed for reliability.
17

18 An RMR was initially identified by ISO-NE for the Potter and Fore River plants for
19 transmission adequacy to prevent overloads and voltage violations in the Southeast
20 Massachusetts area. Further evaluation has identified that the NStar 345 kV upgrades
21 and application of operating procedures addresses the potential for violations of
22 reliability standards in this area. ISO-NE has since notified FERC that these units are not

1 needed for system reliability. Some potential violations still exist for breaker failure and
2 double circuit contingencies for which ISO-NE will not commit generation in real-time
3 operations. National Grid is planning transmission upgrades to address these remaining
4 contingencies. An additional 345 kV circuit breaker will be installed at Auburn Street in
5 2007 to mitigate the impact of these contingencies and alternatives to address the
6 remaining concerns are presently under study.

7
8 **VI. Conclusion**

9 Q. Does this conclude your testimony?

10 A. Yes it does.